Rising Health Care Costs and the Decline in Insurance Coverage

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Introduction

The 1990s were a decade of relative prosperity, yet the percentage of Americans without health insurance coverage rose over 17% between 1990 and 1998. This decline generally reflects a drop in the rates of employer-sponsored coverage. Over the 10 year period from 1987 to 1997, rates of employer coverage for adults (ages 18 to 64) declined from 70% to 66%, with declines of similar magnitude for adult workers. Looking back over a longer period demonstrates that these figures represent a trend since the late 1970s (Farber and Levy, 2000).

Despite a relatively large literature investigating the determinants of insurance coverage, most of that literature examines either coverage decisions at a point in time or trends in employer offerings, employee eligibility or take-up rates. Relatively few studies use multivariate techniques to examine factors contributing to the decline in coverage over time. These studies generally conclude that shifts in demographics or employment patterns cannot explain a substantial portion of declining coverage. For example, the literature shows that increased reliance on part-time workers (Fronstin and Snider, 1996), industry shifts (Long and Rogers, 1995), a combination of labor market factors (Kronick and Gilmer 1999; Glied and Stabile, 2000), or crowdout (Currie and Yelowitz, 1999; Cutler and Gruber 1996) only partially explain the decline in employer provided insurance.

One alternative explanation is that coverage has dropped because the price of insurance has risen. Many studies relating price to coverage use tax rates to proxy for the price of coverage because insurance is generally purchased with pre-tax dollars and thus higher tax rates lead to a lower effective price for coverage (Gruber and Poterba, 1993; Taylor and Wilensky 1983; Royalty 2000, Leibowitz and Chernew, 1992). Despite the widespread

use of the tax rate as a measure of the price of insurance, the work examining trends in coverage has generally not assessed the share of the decline in coverage due to changes in the tax subsidy.

Moreover, the variation in price measured by the tax rate misses the significant rise in premiums over time attributable to the rising costs of health care. This omission might not be important because rising costs of health care might not affect the *loading fee* (the difference between the premium and the expected payout), which defines the price of insurance in most textbooks (Feldstein, 1999; Phelps, 1997).[1]

An alternate approach uses premiums or costs to measure price and thus can capture the effects of rising medical expenditures on coverage rates.[2] Because most research examining the causes for rising expenditures attributes expenditure increases to advances in medical technology, rising premiums may reflect services individuals value (Chernew et al., 1998, Cutler 1995, Newhouse 1992). Standard theories of insurance coverage predict that as the magnitude of the potential loss rises, demand for coverage would increase. If so, one would expect coverage rates to increase as medical expenditures rise. For certain medical services this has certainly been true. For example, coverage rates for pharmaceuticals have risen as pharmaceutical expenditures have risen.

However, the studies that we found that used multivariate techniques to examine the relationship between health care costs and coverage rates found support for the view that increasing costs decrease coverage (Kronick and Gilmer, 1999; Fronstin and Snider, 1996;

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[1] Some medical expenditures may be purchased with pre-tax dollars so variation in tax rates may also affect the cost of care in one in uninsured, but the medical expenditures are only deductible after a threshold is reached, and we believe that tax rates are largely correlated with the load. Glied (2002) provides some evidence that loading costs have not increased substantially over time, though we have not found any definitive work on this topic.

[2] Marquis and Long, 1995, and Swartz, 1988, provide examples of cross sectional work that estimates the elasticity of demand for individual health insurance coverage using premium data.

Cutler 2002). Kronick and Gilmer (1999) rely on national measures of health care costs, relative to income, and generate most of the variance in the cost to income ratio from variation in income, not health care costs. Fronstin and Snider (1996) analyze state level data from 1988 to 1992 and include only one cost proxy, the price of a hospital day. Cutler (2002) uses national level data on employee contributions.

Why might rising premiums be associated with falling coverage? One possibility is that premiums reflect not only desired medical expenditures, but also moral hazard (Pauly, 1968). Although on average individuals may desire new services, at the margin the premiums may reflect growing moral hazard. The magnitude of moral hazard is somewhat controversial (Nyman, 1999), and very little work examines changes in moral hazard over time. On one hand, a growing body of work reports the value of many of the new medical advances but notes that value is not uniform across all clinical areas (Cutler and McClellan, 2001). On the other hand, the 1990s have been characterized by growing attempts to constrain health care costs, suggesting that moral hazard may be a growing (or just a more recognized) concern.

Another possibility is that the relative value of health insurance compared to the medical care one would receive if uninsured is changing over time. The technological progress that is widely considered to be responsible for driving up premiums may also be incorporated to an extent into care provided to the uninsured, particularly for acute services. For some individuals, the value of additional services provided by health insurance coverage above the amount of care available if uninsured may not be worth the cost of the insurance

package. If this is the case, one would expect more individuals to decline options for coverage.[3]

A third possibility is that rising premiums increase the incentives for low risk individuals to separate from high risk individuals in the risk pool. If this is the case adverse selection in the insurance market may increase over time and the market may have a tendency to unravel as costs rise. Thus rising premiums would lead to declining coverage rates.

This paper explores the relationship between health care premiums and coverage rates. It takes advantage of wide geographic variation in changes in premiums and coverage rates. We measure premiums in two ways. First, we use survey data about premiums for private plans and second, we proxy for premiums using Medicare costs. We control for a variety of factors that might explain declining coverage. For example, we include changes in the tax subsidy, Medicaid eligibility, immigration, insurance market regulation, changes in the percent of working spouses, and the effect of charity care availability. Changes in the share of working spouses may influence the contributions employers require of employees to participate in employer sponsored health plans (Dranove, Spier, and Baker, 2000; Gruber and McKnight, 2002).

In some specifications, we also control for the growth in HMO penetration. This variable may be endogenous because an exogenous demand shift for coverage would increase the penetration of all forms of coverage. Yet managed care represents perhaps a low cost way for individuals to obtain coverage and our estimates provide insight regarding the extent to

[3] See Cutler (2002) for a more detailed discussion. The effect of technological progress of the utility of being uninsured vs. insured depends on the availability of charity care, norms of practice, and the marginal utility of the incremental cost of insurance to cover new services.

which the penetration of managed care might limit growth in the ranks of the uninsured.[4] Inclusion of this variable allows us to explore this effect.

We show that premium increases result in reductions in rates of any (private or public) insurance coverage. We do not find a significant effect of any other explanations for insurance coverage declines. The inflation adjusted increase in spending in private premium data ($645) results in an estimated 1.69 percentage point decline in rates of any insurance coverage. Using an additional data source, Medicare Part B spending, gives similar, though weaker results. Evaluating the effect of the same increase in spending results in an estimated 1 percentage point decline in coverage rates. We also examine these explanations separately for private and public coverage. These analyses show that as expected, rising spending results in declines in private, rather than public coverage.

Our results have important conceptual and policy implications. They suggest that more intellectual and policy focus must be placed on the fundamental issue of how, in a world with ever better, and more expensive care options, we will finance access to care and what principles will be used to determine how best to allocate care.

Empirical Framework

We posit a model of coverage in which probability of coverage is a function of individual and market (MSA) characteristics, captured below, in aggregate, with market dummy variables, which may vary over time:

[4] Managed care premiums may not be lower than premiums for other insurance products, but typically managed care plans have lower enrollee cost sharing provisions. Because managed care penetration can influence costs for all payers, the estimates do not provide the full effect of managed care on coverage rates (Baker, 1997, Zwanziger and Melnick, 1988, Robinson, 1996.)

(1) $C_{imt} = X_{imt}\beta_t + \delta_{mt} + e_{imt}$

Where:

C_{imt}: Coverage for person i in market m at time t
X_{imt}: Characteristics for person (and household) i in market j at time t
β_t: Coefficients (time varying)
δ_{mt}: Market dummies
e_{imt}: error term

The market effect is in turn a function of market traits, as specified below.

(2) $\delta_{mt} = Z_{mt}\,\lambda + \zeta_m + u_{mt}$

Where:

Z_{mt}: Market traits
λ: Coefficient vector (note not time varying)
ζ_m : Market level fixed effect
u_{mt}: Market level random effect

Plugging (2) into (1), the model becomes:

(3) $C_{imt} = X_{imt}\beta_t + Z_{mt}\,\lambda + \zeta_m + u_{mt} + e_{imt}$

We estimate (3) using a probit model allowing for the correlation among observations from the same market at any given time t. We include market level fixed effects to capture the ζ_m.

Data

Our primary data source is the March Current Population Survey (CPS). We pool data from 1989-1991 to derive a measure of any health insurance coverage among the nonelderly, by MSA in the early 1990s and pool data from 1998-2000 to derive measures for the late

1990s.[5] In most specifications, we restrict the sample to individuals under age 65 who live in one of the 64 MSAs for which we have data on private premiums. In the specification that includes Medicare spending, because the change in adjusted coverage rate for each MSA is estimated with error, we restrict the sample to only those MSA with greater than 1000 observations in the combined 1989-1991 and 1998-2000 sample. This yields a sample of 124 MSAs.

In addition to providing data on coverage for individuals, the CPS also provides a variety of demographic measures, such as age, education, and income. We use these measures both as individual traits (X variables) and to generate MSA level measures that may be related to coverage rates indirectly. For example, low-income workers in markets with many high-income workers may be more likely than other low-income workers to get coverage because employers may be more likely to offer coverage to all workers. Similarly, workers in markets with relatively many working spouses may be less likely to get coverage, even if their spouse does not work, because employers may adjust employee premium contributions for all workers (Dranove et al., 2000).

We include variables for individual, family, and head of family characteristics. We create families in the form of "health insurance units" that include the group of individuals who would be covered under a typical private insurance policy: family head, spouse, and children under 18, or children attending college through age 21. All family variables are created in terms of health insurance units. The demographic variables at the individual and head of household level include: age (5 yr dummies), sex, race/ethnicity, education, and

[5] This sample period is after the CPS changed the questions regarding coverage in 1988. Changes to CPS sampling, as well as health insurance question ordering and wording, in the mid 1990's, common across all MSAs, should "difference out" of our estimates.

marital status.[6] We also include, for each family member, dummy variables for having more than one worker in the family or having no workers in the family, and interactions of being a spouse or a child in a family with multiple workers. We interact these individual and family characteristics with time to allow for the possibility that their effect changes over time. We also include variables capturing income deciles, income deciles interacted with each marital status type, and income, marital status, and time interactions. Finally, we add dummies for each child age, zero through seventeen and, following Cutler and Gruber (1996), we also add controls for average family medical care spending per child age. We treat all of the individual level variables as exogenous to health care costs and coverage.

We also include the following series of employment related variables for individuals and their family head: firm size, industry, occupation, full time/part time, and government employee. We also interact these variables with time. Employment patterns may respond to changes in the environment surrounding health care coverage changes. For example, rising costs may alter the mix of full or part time workers and may alter the distribution of firm size in equilibrium. We expect that these effects are small, but to the extent that they exist, our measures of the impact of costs on coverage changes will not pick up the portion of that effect that works through these variables.

We rely on two measures of health care costs. Our first measure is based on premiums from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) and the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999). This survey data gave us zip code level premiums for

[6] Including both individual level and household level variables results in considerable correlation between some covariates. Yet our purpose is to capture as much of the non-MSA specific effects as possible, not test hypotheses. This multi-collinearity is not a large concern and the estimates of the effects of market traits are not substantively affected by omitting the head of household variables.

7027 plans offered by 4312 firms. We aggregated zipcodes to the MSA level using data from the US Census Bureau. Because over time there were changes in coverage and plan types, we computed MSA level cost measures by estimating a Hedonic premium model including MSA x time dummies as well as plan trait and traits of the purchasing firm that could affect premiums (industry, size, etc.). The MSA dummies from these models serve as our adjusted measure of cost growth. We only use data from MSAs with at least 10 observations in each period, yielding 64 MSAs. Data are in real 1999 dollars.

Our second measure of costs over time is based on Medicare expenditures. We use county-level average per beneficiary fee-for-service Medicare expenditures for Part B, obtained from the Office of the Actuary in CMS. We use CMS actuarial factors to adjust per beneficiary spending for demographic characteristics including age, gender, welfare, and institutional status. Spending is in real $1999; we adjust for inflation using the GDP deflator. Adjusted county level spending is aggregated to the MSA level using MSA codes taken from the 1990 and 1998 Area Resource Files. This is an imperfect proxy of the cost for private coverage because it pertains to a different, more regulated, population.

We compared both spending measures to changes in non-elderly state health care spending per capita using CMS State Health Accounts data. The MSA level correlation between premium changes in the private sector data and changes in state health care spending per capita for non-elderly is 0.64.[7] For the Medicare data, we chose Medicare part B expenditures over total Medicare spending because its correlation with state health care spending per capita for the nonelderly is higher than that of Medicare overall. The correlation between changes in Medicare part B spending per capita and changes in non-elderly state

health care spending per capita is 0.23, while the corresponding correlation for Medicare overall is 0.08. The relatively low correlation may be because over the study period, home health care services, a service not widely used by the working age population, were an important driver of cost growth in the Medicare population.[8] Yet, the Medicare data offer several advantages. First, we are less concerned about changes in coverage type (which affect state spending per capita).[9] Second, these data allow us to expand our sample beyond those MSAs covered in the private sector data.

Our measure of state income tax rates is based on estimates using the NBER TAXSIM simulator. A sample of 419,424 nonelderly individuals not classified as dependents from 1995 Statistics of Income data was run through the simulation for federal and state tax laws for both 1990 and 1999. Income from the 1995 data was adjusted to account for inflation between 1990, 1995, and 1999. Following methods used in Gruber (2001), we then aggregate these data to create average marginal tax rates that vary by marital status, income decile, state, and year. Tax price reflects the price of insurance after taking into account the tax subsidy to health insurance. We calculate the the tax price of insurance as $(1 - \tau_{fed} - \tau_{state} - \tau_{ssec} - \tau_{mc}) / (1 + \tau_{ssec} + \tau_{mc})$, where fed and state are federal and state income tax rates, respectively, and ssec and mc are the Social Security and Medicare payroll taxes. People with higher tax rates have a higher tax subsidy, and a lower tax price of insurance.

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[7] Data are for 1990 and 1998 using state of provider data available at http://www.cms.hhs.gov/statistics/nhe/. The correlation was done at the MSA level. State spending was assigned to all MSAs in the state. MSAs in multiple states are assigned to the state in which the greatest share of the population lives.

[8] A particular concern is that one driver of cost growth in the Medicare population over the study period was home health care services, a service not widely used by the working age population. We chose Medicare part B expenditures because we believed this measurement issue would be less in the part B data. Prior to 1998, home health care services were financed through Medicare part A. Beginning in 1998, a portion of home health spending (specifically, spending for visits that are that are not within the first 100 visits following an institutional stay) was transferred to part B on a phased-in basis: one-sixth of such spending in 1998 and one-third in 1999. See Committee on Ways and Means, U.S. House of Representatives. 2000 Green Book. http://aspe.hhs.gov/2000gb/sec2.txt.

This approach addresses several identification concerns. First, creating average marginal tax rates using a national sample ensures that changes in our tax variable reflect changes in tax law, not changes in demographics. Second, the data capture within-state variation in tax rates by marital status and income level. Insurance coverage may vary by marital status and income for reasons unrelated to the tax subsidy, and this relationship may change over time. Because of our controls for income decile, marital status and associated interactions, this method essentially compares the responses to tax changes of groups that are matched on income and marital status.

Our Medicaid eligibility measure reflects the fraction of family medical spending eligible for Medicaid based on state Medicaid (or SCHIP in 1999) eligibility levels for children as of 1990 and 1999. We build on programming files created by Reagan Baughman, and use National Governors' Association (1990, 2000) and Intergovernmental Health Policy Project (1988, 1990, 1991) data on state Medicaid eligibility criteria to create this measure. For the early period, eligibility reflects poverty level expansions and state welfare eligibility standards as of January 1990. For the later period, eligibility reflects state poverty-related Medicaid and SCHIP eligibility levels as of October 1999.[10]

Following methods used in Cutler and Gruber (1996), to estimate the fraction eligible for each child age we run a national sample of all children of each age 0 through 17 from the March 2000 CPS through each state's eligibility criteria as of October 1999 and January 1990

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[9] There may be issues involving availability of managed care or supplemental coverage that affect estimates of costs using this data.

[10] Both the early and late 1990s are periods of rapid change in state Medicaid eligibility, the former due to optional and mandatory maternal and child health Medicaid expansions, the latter due to state implementation of the State Children's Health Insurance Program (SCHIP), enacted in 1997. The timeframe of 1999 was selected in part because state implementation of SCHIP was farther along than in the prior year. We are grateful to Reagan Baughman and Kosali Simon for helpful conversations.

(adjusting income to 1990 dollars for the latter).[11] For this sample, we create family units that approximate state rules for determining family size and income for welfare/Medicaid eligibility (and family structure for 1990 welfare eligibility). We merge these data to the CPS sample by age, state, and year. Using methods and spending data from Cutler and Gruber (1996), we weight eligibility by multiplying eligibility levels by average spending by age. To create a measure of family (health insurance unit) eligibility, we divide the total Medicaid-eligible spending per HIU by total spending in the HIU. The instrument for Medicaid is the fraction of spending eligible for Medicaid per HIU.

With this method, and our controls for child age and spending, we are able to compare the effects of state laws independent of differences in state demographics and economic conditions. We also avoid the endogeneity that arises if eligibility is determined at the individual level, because factors that determine individual level eligibility (e.g., presence of children) may be correlated with the demand for insurance. This approach also addresses measurement error in using CPS-reported income to simulate children's Medicaid eligibility.

Our approach presumes that the effect of changes in public coverage on overall coverage rates works primarily through changes in children's eligibility for coverage. We may underestimate an effect because we do not include adults.[12] In addition, we do not include variations across states in Medicaid co-premiums, copayments, waiting periods, et cetera, despite substantial variation along these dimensions by 1999 in SCHIP expansions. See Appendix 1 for a detailed list of assumptions and criteria used to code eligibility.

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[11] We use the entire sample because it produces a more accurate distribution of income across child ages than a small sample per age group. We drop out children under age 1 at the time of the survey since we calculate eligibility based on age in prior year.

[12] In 1990, eligible nondisabled adults were primarily single female heads of households, while a relatively small but growing number of states provide poverty-related coverage of families by 1999.)

Herring (2001) reports that the availability of charity care reduces the probability that individuals will purchase private insurance. We measure MSA-level availability of uncompensated care as the number of public or teaching hospital beds per capita in an MSA. Data on hospital beds are from the American Hospital Association's 1990 Annual Survey of Hospitals. MSA-level population data are for 1990 from the 2001 Area Resource File. We interact the share of nonfederal, general medical/surgical public or teaching hospital beds per capita in 1990 with time as a measure of whether the effect of charity care availability on coverage rates changes over time. We use this measure instead of changes in the share of beds over time because changes in the availability of public and teaching hospital beds may be endogenous to changes in insurance coverage rates.

We add data on the share of the MSA population that is foreign born using 1990 Census data from the Area Resource File and estimates from the pooled 1998-2000 Current Population Surveys. We include one measure of regulatory reform in the insurance market, from data provided by Kosali Simon: whether a state has passed rating restrictions or guaranteed issue in the small-group insurance market in 1990 or 1997. These reforms generally would be expected to increase coverage, but reaction to such reforms (for example insurers pulling out of markets or segments of market) might diminish their effect. Recent studies that have examined the effects of small group market regulations have found little effect of these laws on insurance coverage rates (Marquis and Long, 2001; Zuckerman and Rajan, 1999).

We also include a measure of MSA level unemployment from BLS since macro-trends in the local economy may affect coverage. In some specifications, this is interacted with costs since the impact of costs on coverage may depend on the health of the local economy.

HMO penetration is computed as a share of the non-elderly population (privately or publicly insured) enrolled in HMOs. For 1990, we use county level HMO penetration data compiled by Laurence Baker from InterStudy's HMO data files. We use InterStudy MSA level penetration data for 1999.[13] We use population data for 1990 and 1999 from the Area Resource File to adjust penetration levels from total population to the non-elderly population. One should note that the coefficient on HMO penetration captures not only the direct effect of adding a possibly preferable insurance option to the choice set (HMOs), but also the effects that adding another coverage option might have on equilibrium in the insurance market. Chernew and Frick (1999) report that in theory the effect of managed care on the stability of equilibrium in insurance markets is ambiguous. Moreover, the financial pressure placed on providers by managed care may influence the availability of charity care in ways not captured by our charity care measures.

Results

The decline in coverage observed during the 1990s was not uniform across the country. Figure 1 illustrates the change in adjusted coverage rates across MSAs. Some of the observed variation is attributable to sample variation, yet statistical tests reject the hypothesis that the change in coverage was the same across all MSAs. Table 1 further explores this geographic variation, reporting the changes in adjusted coverage rates by characteristics of MSAs. The change in coverage in MSAs varies quite a bit by region. MSAs in New-England had on average a 2.3 percentage point drop in adjusted coverage rates, whereas those in the Middle Atlantic experience a 4.9 percentage point decline.

[13] Prior to 1994, InterStudy did not collect HMO penetration at the MSA level.

Figure 2 illustrates the variation in health care cost inflation across MSAs from the private premium data. Just as there is cross sectional variation in practice patterns, there is variation across MSAs in the rate of health care cost inflation. This variation is likely attributable to differences in the manner in which the physicians adopt medical technologies and variation in the pressure for cost containment. The relationship between coverage and costs, weighted by the combined number of CPS observations, can be seen in Figure 3.

Table 2 shows means of variables for the 64 MSAs in the private premium data for the pre and post time periods. The drop in coverage (coverage difference) was 3.1 percentage points. Private insurance declined by 3.3 percentage points, and public coverage increased by .07 percentage points. Private premiums increased by $0.645 (in thousands of dollars), and Medicare Part B spending by $0.82 (in thousands of dollars). The tax price of insurance declined by 0.4 percentage points. On average 87 percent of individuals in our sample reside in a state that enacted insurance reforms of either rating restrictions or rating and guaranteed issue in the small group market. The share of working women in an MSA increased by 1.4 percentage points. The fraction of Medicaid eligible family medical spending increased by 4 percentage points. Mean teaching and public hospital beds per capita in 1990 are .0013. The mean share of the MSA population that is foreign born increased by 2 percentage points. The MSA unemployment rate declined by 1.3 percentage points.

Table 3 reports the results from our base specification.[14] In addition to person level traits, these models control for: changes in tax rates, changes in the percentage of working women, changes in insurance market regulation, changes in the share of population that is foreign born, changes in the share of children who are eligible for Medicaid, and availability

[14] We do not report the coefficients from the individual level covariates because the large number of covariates and because their correlation make them difficult to interpret.

of charity care. They also adjust for several MSA traits including changes in the average family income in an MSA, changes in MSA unemployment, changes in the percent age 65 or older and percent non-white in the MSA.

Column 1 of Table 1 reports results of a probit of any insurance coverage that uses private premium data for the measure of spending growth. For all specifications, we report probit derivatives evaluated at the mean of the data. The results suggest that coverage rates declined more rapidly in MSAs that experienced more rapid cost growth.[15] The final row of column 1 reports an estimated effect of the increase in inflation-adjusted premiums ($0.645, in thousands) on coverage rates. The inflation-adjusted premium increase results in an estimated 1.69 percentage point decline in rates of any insurance coverage. The sign and statistical significance of the premium effect are robust to numerous changes in the specification including changes in how we control for income and marital status and associated interactions.

Contrary to expectations, increases in the tax price are significantly associated with increases in insurance coverage rates. We do not attach much importance to this result for a variety of reasons. First, it is not robust to changes in specification. If we change our income controls, for example, the result is no longer statistically significant. Second, as discussed above, we have little variation in the tax data. The other coefficient that is not consistent with our expectations is that on the share of the population that is foreign born. Though not statistically significant, it is associated with an increase in coverage.

[15] We have also tried instrumenting to deal with the measurement error in costs arising because the private premium estimates are from regression estimates. Preliminary results using Medicare spending as an instrument for the private premium data show that the effect of spending increases in the IV, consistent with the notion that the private premium data are very noisy. Use of other functional forms, such as taking the natural logarithm of price and income, do not change the substantive findings.

The other signs are generally consistent with expectations, though with the exception of the fraction of family spending eligible for Medicaid, they are not statistically significant.[16] Of the coefficients not statistically significant, insurance reforms appear to increase coverage on balance. A greater percentage of working women is associated with declines in coverage. Availability of a larger share of public and teaching hospital beds in 1990 is associated with declines in insurance coverage rates. The unemployment rate is inversely related to coverage, suggesting that coverage drops were greater in MSAs experiencing economic difficulty, but the standard error of the estimated coefficient is large. Because the measure of coverage includes public coverage, the coefficient captures the effect of economic troubles on private coverage, net of any associated increase in public coverage.

Column 2 of Table 3 presents estimates of the base specification using the Medicare part B spending measure. As noted above, Medicare spending pertains to a different, more regulated population than the nonelderly, but is less subject to changes in benefits over time. These results, from a larger set of MSAs, are similar to those reported in column 1. The coefficient on spending is smaller, but similar to that in column 1, and is still significant at the 5 percent level. In this specification, the coefficient on tax price remains positive and significant at the 10 percent level. The coefficient on working women is negative and significant at the 5 percent level. Coefficients on the other variables are similar in sign and magnitude to the results in column 1. The increase in inflation-adjusted premiums, reported in the last row, results in an estimated 1 percentage point decline in rates of any insurance coverage.[17]

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[16] This measure is the net effect of expanding public coverage and any offset due to declining private coverage.
[17] This is estimated using the inflation-adjusted increase in private premiums ($645) for comparability. Estimating the impact of the inflation-adjusted increase in Medicare Part B spending ($820) results in a 1.29 percentage point decline.

Our main focus in this paper is on understanding explanations for overall rates of coverage decline. However, we are also interested in how the explanations relate to private and public coverage separately, for several reasons. First, coverage declines occurred among the privately insured, rather than the publicly insured, over our period of study. Also, looking at private and public coverage separately alongside changes in overall coverage allows us to better understand how the various explanations affect different coverage types. For example, we would expect that spending increases would primarily in private, rather than public coverage declines.

Column 3 shows results from a probit with the same set of MSA level variables and any private insurance as the dependent variable.[18] The results suggest that the association between premium increases and overall coverage declines works through declines in private coverage. The coefficient on private premiums is negative, significant, and larger in absolute magnitude than in the any coverage probit.

Other of our explanatory variables also are expected to affect private coverage rates in particular. Here, tax price has the expected negative association with rates of any private coverage, but is not statistically significant. The share of working women in an MSA is negative and statistically significant, as Dranove et al. (2000) predict. Consistent with existing literature, we find that increases in the Medicaid eligible share of spending are significantly associated with declines in private insurance coverage, but that the effect size is small. State insurance reforms are again positive, but insignificant. Charity care availability is associated with a decline in private coverage, significant at the .10 level. Increases in the share of the population that is foreign born in an MSA and in mean MSA unemployment rates

[18] Any private insurance is defined as any group or nongroup private coverage, which includes own employment-based coverage, coverage as a dependent, and individually purchased private insurance.

are associated with declines in private coverage, though are not statistically significant. Increases in mean family income in an MSA are significantly associated with increases in private coverage. The mean inflation adjusted increase in spending of $0.645 results in an estimated 2.5 percentage point decline in private insurance coverage rates (from a total decline of 3.3 percentage points).

Column 4 of Table 3 shows the results of the probit with public coverage as the dependent variable. We find no effect of rising premium costs on public coverage rates. The coefficient on premiums is negative but insignificant, and is an order of magnitude smaller than in the private coverage probit. Increases in Medicaid eligible share of family health care spending are positively and significantly associated with increases in public coverage, as are increases in the share of working women in an MSA. The coefficient on tax price is positive but insignificant. Increases in the share of MSA population that is foreign born are associated with increases in public coverage, significant at the 10 percent level. State insurance reforms are negatively associated with having public coverage, but this relationship is not significant. Charity care availability and increases in the MSA unemployment rate are associated with increases in public coverage, but are not significant. Increases in the share of MSA population that is nonwhite are significantly associated with declines in public coverage, as are increases in mean family income in an MSA.

Table 4 shows four additional specifications that add variables to the base specification. Column 1 repeats the base specification presented in column 1 of Table 3. Column 2 adds the change in HMO penetration to the model. This variable is likely endogenous, but captures to some extent the ability of managed care to provide a lower cost coverage option. The coefficient on HMO penetration has the hypothesized sign, but is not

statistically significant. As in the base specification, the effect of spending remains negative and statistically significant. The sign on the tax price variable is still positive and significant, contrary to the hypothesized positive association. The remaining variables have the expected signs. The coefficient on Medicaid is positive and significant at the .01 level, and the coefficient on working women is significant at the .10 level. The estimated impact of spending on coverage rates is slightly higher than in the base specification.

Column 3 investigates the impact of HMO penetration in a slightly different manner, including the level of HMO penetration in 1990 as opposed to the change. This may reduce the endogeneity bias. The HMO coefficient continues to have the correct sign, and is significant at the 1 percent level. Inclusion of this variable weakens the effect of spending, cutting it in nearly in half, though it is still significant at the 5 percent level. One interpretation is that this is consistent with a story that the effects of rising prices for a 'standard' policy are mitigated if lower cost substitutes exist. Coefficients on the remaining variables have the expected sign, except for the tax variable, which continues to be positive and significant. The Medicaid variable is positive and significant, as expected. The inflation-adjusted increase in spending results in a 1 percentage point decline in coverage rates.

Discussion

The data demonstrate that rising health care costs are associated with drops in coverage. This is consistent with common intuition, but requires bit of a re-examination of how economists typically measure the price of coverage. The results suggest that it is important to consider total health insurance premium costs, rather than just the load. Other

explanations for declining coverage, such as the increase in spousal employment, may have played a role, but the evidence regarding these variables is weaker.

Our results regarding the effects of tax rates in the base specification are counter-intuitive, suggesting coverage is positively related to tax price (inversely related to tax rates). This finding was not very robust to specification changes. For example, changes in how we controlled for income result in an insignificant coefficient on the tax variable. We attribute the findings related to tax rates to the relatively small change in taxes observed over the study period, which we believe generates a lot of noise in the results. When we examine only private coverage, where the effect would be stronger, we do find the hypothesized tax effect, but it is not statistically significant. Restricting the model to only workers and looking at own employer sponsored coverage, which is most similar to other work in this area, does generate statistically significant results consistent with the literature. We believe the correct interpretation of these findings is this that there is a tax effect, concentrated on working individuals, but that during our study period the variation in tax rates was too small to account for much of the observed decline in coverage. Moreover, our measure of tax price declined over the study period so tax rate changes could not be an explanation for falling coverage rates in the aggregate. Our results should thus not be interpreted as indicating that taxes are not related to coverage. Instead they should be interpreted as indicating that the geographic variation in the decline in coverage observed over the 1990s was not likely due to changes in the state tax codes.

There are several reasons why we believe our estimates of the impact of health care costs on coverage may be conservative, (i.e., biased upwards towards zero). First, measurement issues may reduce our estimated effect size. Our measures of costs suffer from

measurement error. This will tend to bias the coefficients towards zero. Second, by lumping public and private coverage together, our 'any coverage' regressions are not designed to focus on a sample where the effects of rising premiums might be greater. In fact as our analysis of private coverage illustrates, the effect of rising costs on private coverage is greater than that reported in our 'any coverage' analysis.

Third, our adjustment process treated several labor market variables such as firm size/ industry/ and occupation as exogenous. Any effect of rising costs operating through these dimensions is not captured in our measures.

Given the evidence that implies that coverage rates are inversely related to health care costs, it is reasonable to assume that coverage rates will continue the long-term decline as long as health care cost growth exceeds income growth. This creates a fundamental challenge to policy makers who recognize that individuals desire access to new medical technologies but that the costs of coverage may become increasingly less affordable.

Appendix 1: Medicaid Assumptions

Age: Eligibility is for children under age 18. Consistent with Meyer and Rosenbaum (2001), we subtract 1 from the reported age, reflecting characteristics reported for the prior year (eg, income).

Eligibility types: Eligibility is based on poverty related or welfare criteria for 1990, and Medicaid and SCHIP criteria for 1999. State-only public health insurance programs, Medicaid medically needy and other eligibility pathways such as receipt of Supplemental Security Income for disabled children are not included.

Family unit/structure: We include own children and other related children under age 18 as part of the family unit for the purpose of determining family size (which is used in income calculations). Unrelated children, including foster children, are not included in family units.

Income: Income is earned income only (no child support) of head and/or spouse if present only (consistent with Meyer & Rosenbaum, 2001). Income of children, other adult relatives or nonrelatives is not counted.

Welfare eligibility: A family must meet a series of criteria related to income and family structure to be eligible for welfare.

a) Family structure. For the purpose of determining welfare eligibility, families must be a single female headed household, unless the state has adopted the Ribicoff option for all children (consistent with Currie & Gruber, 1995). Data for on states' adoption of the Ribicoff option, which permites children that meet welfare income eligibility levels to be counted as eligible regardless of family structure, is from CRS, 1993.

b) Income eligibility. A family must meet a gross income test (185% of state determined "need standard"); and have countable income below a state determined "payment standard" as of January 1990. Data on need and payment standards is from NGA (1990). Consistent with Currie and Gruber (1995), and Meyer and Rosenbaum (2001), we adjust the payment standard adjusting for the following disregards: $90 work expense, $30 and 1/3 of monthly earned income (for first 4 months), which translates to 3/2(payment standard) + 120 as the countable income level. See Yelowitz (1995) and CRS (1993) for an explication. Consistent with Meyer & Rosenbaum (2001), we do not include asset tests or disregards for child care expenses.

Poverty level eligibility: we do not apply disregards to calculate eligibility for poverty-level expansions or SCHIP. In 1999, all children are covered by a poverty related Medicaid or SCHIP expansion. We do not include data on premiums or cost-sharing requirements.

Immigrants. In 1999, immigrants are treated as ineligible for Medicaid if they arrived any time in 1996 or later and state has not chosen to fund immigrants that arrive to US after August 22, 1996, using 1999 data (CLASP and CBPP, 2000).

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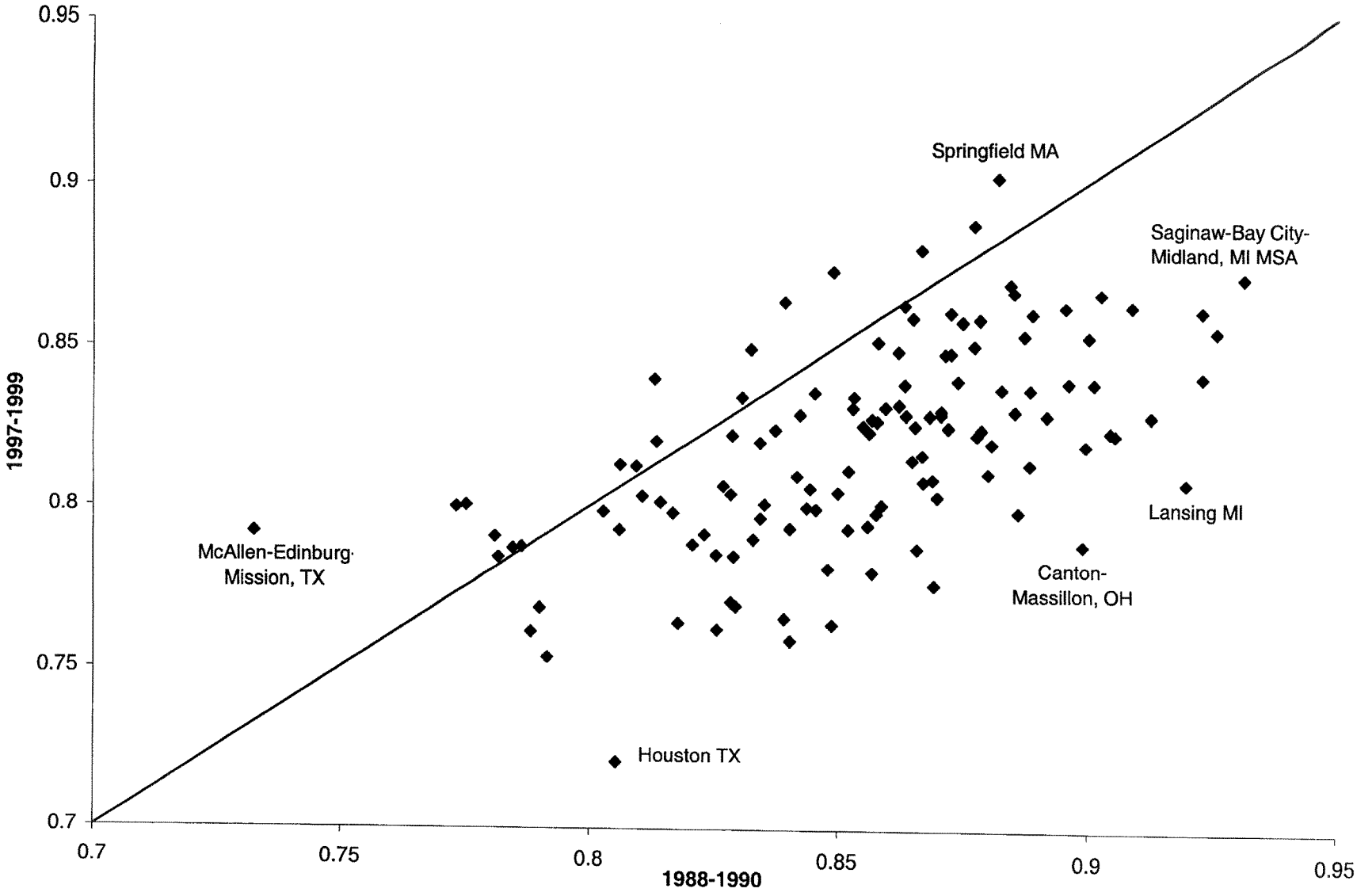
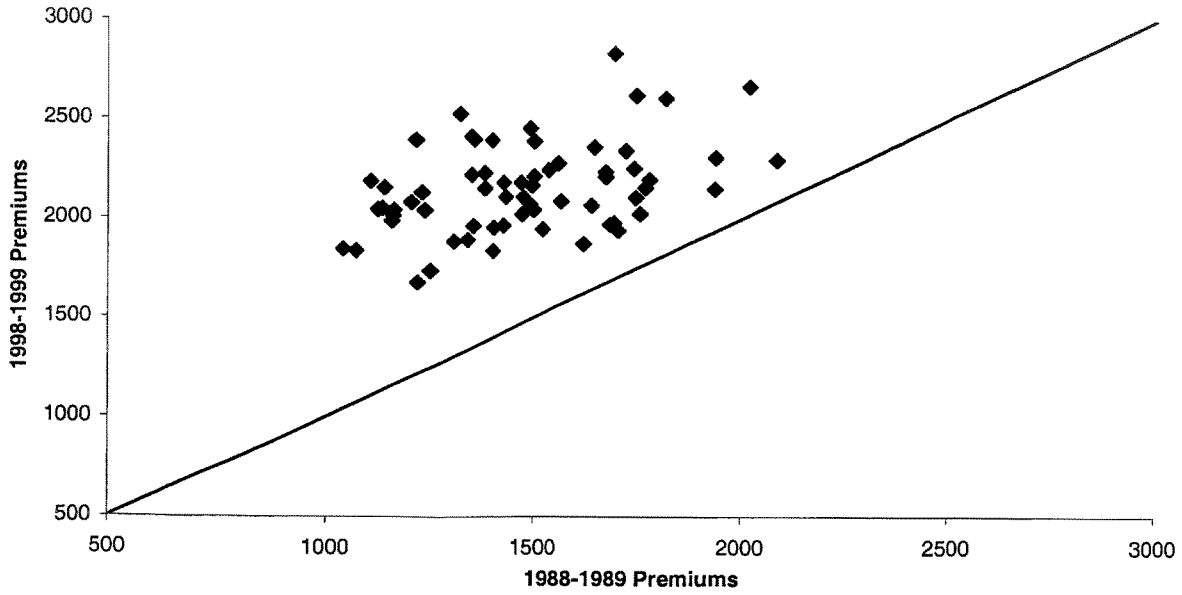
Figure 1: Rates of Any Insurance Coverage by MSA, 1988-90 and 1997-99



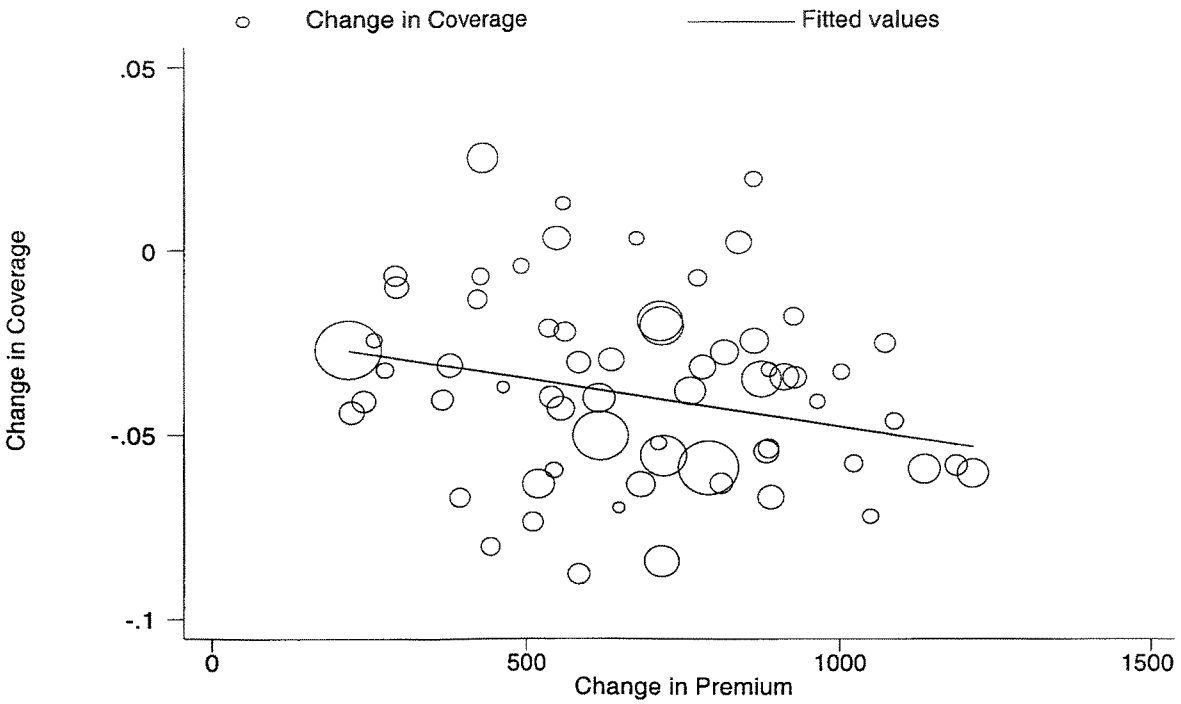
Data are for 124 MSAs with over 1000 observations in combined March 1989-91 and March 1998-00 Current Population Surveys.

Figure 2: Changes in Health Insurance Premiums by MSA, 1988-89 1998-99



Data for 64 MSAs are for private premiums from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999).

Figure 3: Any Coverage Change versus Private Premium Change



Notes:
MSAs are weighted by the number of CPS observations.
Private premium data are from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) and the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999).

Table 1. Descriptive Statistics on Changes in Any Insurance Coverage, MSA Level Nonelderly Population

Characteristic	N	Mean Diff	St Dev
Region			
New England	7	-0.023	0.023
Middle Atlantic	21	-0.049	0.020
East North Central	20	-0.048	0.021
West North Central	7	-0.040	0.022
South Atlantic	25	-0.025	0.030
East South Central	7	-0.035	0.031
West South Central	13	-0.035	0.039
Mountain	10	-0.037	0.024
Pacific	14	-0.029	0.017
MSA Size (1989-91)			
100,000 - <250,000	10	-0.028	0.033
250,000 - <500,000	28	-0.034	0.043
500,000 - <1 million	33	-0.034	0.027
1 million - <2.5 million	26	-0.032	0.021
2.5 - <5 million	11	-0.039	0.031
5 - <10 million	7	-0.036	0.018
10 million or more	9	-0.048	0.017
Income (1989-91)			
< $38629	31	-0.034	0.033
$38629 - < $42960	31	-0.030	0.024
$42960 - < $45772	31	-0.043	0.021
≥ $45772	31	-0.039	0.026
Share in Small Firms (1989-91)			
<0.203	31	-0.039	0.026
0.203 - 0.227	31	-0.040	0.024
0.227 - 0.247	31	-0.041	0.030
>0.247	31	-0.031	0.025
Total	124	-0.037	0.026

Notes:
Data are from pooled 1989-1991 and 1998-2000 March CPS.
Income is mean MSA-level family income from 1989-91 March CPS, in real $1999.
Firm size is mean MSA-level average of workers in firms with <100 employees.

Table 2. Means of Dependent and Independent Variables, 64 MSAs

	Private Premium MSAs 1989-1991		Private Premium MSAs 1997-1999	
	Mean	**St. Dev.**	**Mean**	**St. Dev.**
Any coverage	0.85	0.36	0.82	0.39
Any private coverage	0.76	0.43	0.72	0.45
Any public coverage	0.13	0.33	0.13	0.33
Private premiums (1000's)	1.57	0.26	2.21	0.22
Medicare Part B spending	1.55	0.37	2.37	4.27
Tax price	0.57	0.07	0.57	0.10
State insurance reforms	0.00	0.00	0.87	0.34
MSA Percent working women	0.63	0.06	0.65	0.06
Percent Medicaid eligible share	0.04	0.05	0.08	0.09
MSA Teach/pub beds per capita 1990	0.0013	0.0006		
MSA percent foreign born	0.12	0.10	0.14	0.11
MSA unemployment rate	0.05	0.01	0.04	0.01
MSA average family income (1000's)	45.08	5.97	54.18	8.22
MSA percent elderly	0.11	0.03	0.11	0.03
MSA percent nonwhite	0.30	0.16	0.35	0.17
MSA HMO penetration rate	0.21	0.11	0.38	0.14

Notes:
Premiums, Medicare spending, and income are in real 1999 dollars.
Medicare spending means are for a sample of 124 MSAs.
Private premium data are from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) and the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999).

Table 3: Results

Dependent Variable	(1) Any Insurance Coverage	(2) Any Insurance Coverage	(3) Any Private Coverage	(4) Any Public Coverage
private ind. prem.	-0.0262***		-0.0391***	-0.0033
(1000's)	(0.0079)		(0.0107)	(0.0072)
Medicare Part B		-0.0157**		
(1000's)		(0.0069)		
tax price	0.3538**	0.2819*	-0.0603	0.2237
	(.1554)	(.1492)	(.1327)	(.1448)
insurance reforms	0.0101	0.0130*	0.0132	-0.0003
	(0.0085)	(0.0071)	(0.0092)	(0.0044)
% working women	-0.1075	-0.0897**	-0.2606***	0.1571***
	(0.0657)	(0.0456)	(0.0879)	(0.0496)
% Medicaid elig (<18)	0.2764***	0.2645***	-0.0752***	0.3353***
	(0.0177)	(0.0169)	(0.0267)	(0.0207)
teach/pub beds/capita 90	-3.96	-2.61	-8.25*	3.69
	(3.15)	(2.14)	(4.84)	(2.65)
% foreign born	0.0347	0.0206	-0.2038	0.1673*
	(0.1074)	(0.0732)	(0.1536)	(0.0929)
unemp. rate	-0.0034	0.0154	-0.1970	0.1063
	(0.1972)	(0.1559)	(0.2826)	(0.1796)
av. income	-0.0002	-0.0006	0.0024***	-0.0013***
(1000's)	(0.0005)	(0.0004)	(0.0007)	(0.0005)
% nonwhite	-0.0358	-0.0492	0.1365	-0.1330**
	(0.0612)	(0.0372)	(0.0949)	(0.0562)
% elderly	-0.0293	-0.0002	-0.0066	0.0174
	(0.1258)	(0.0879)	(0.1696)	(0.0880)
Observations	333431	435193	333431	333431
Impact of spending on any coverage	-0.0169	-0.0101	-0.0252	-0.0021

Notes:
Probit results are reported as derivatives evaluated at the mean of the data.
Standard errors in parentheses.
Private premium data are from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) and the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999).
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Results, HMO Specifications

Dependent Variable	Any Insurance Coverage		
	(1)	(2)	(3)
	Any Insurance Coverage	**Base + HMO Change**	**Base + HMO Level**
private ind. prem.	-0.0262***	-0.027***	-0.0156**
(1000's)	(0.0079)	(0.0081)	(0.0076)
tax price	0.3538**	0.3572**	0.3550**
	(.1554)	(.1553)	(.1554)
insurance reforms	0.0101	0.0104	0.0104
	(0.0085)	(0.0080)	(0.0087)
% working women	-0.1075	-0.1138*	-0.0725
	(0.0657)	(0.0672)	(0.0657)
% Medicaid elig (<18)	0.2764***	0.2762***	0.2775***
	(0.0177)	(0.0177)	(0.0178)
teach/pub beds/capita 90	-3.96	-3.89	-0.8578
	(3.15)	(3.19)	(3.28)
% foreign born	0.0347	0.0379	0.0313
	(0.1074)	(0.1079)	(0.1027)
unemp. rate	-0.0034	-0.0240	-0.1956
	(0.1971)	(0.1901)	(0.2196)
av. income	-0.0002	-0.0001	-0.0003
(1000's)	(0.0005)	(0.0005)	(0.0005)
% nonwhite	-0.0358	-0.0373	-0.0177
	(0.0612)	(0.0618)	(0.0609)
% elderly	-0.0293	-0.0233	0.0352
	(0.1258)	(0.1284)	(0.1309)
hmo penetration		0.0231	
		(0.0224)	
hmo pen. level 1990			0.0654***
			(0.0175)
Observations	333431	333431	333431
Impact of spending on any coverage	-0.0169	-0.0174	-0.0101

Notes:
Probit results are reported as derivatives evaluated at the mean of the data.
Standard errors in parentheses.
Private premium data are from the KPMG Survey of Employer-Sponsored Health Benefits (1988, 1989, 1998) and the Kaiser Family Foundation/Health Research and Educational Trust Survey of Employer-Sponsored Health Benefits (1999).

* significant at 10%; ** significant at 5%; *** significant at 1%